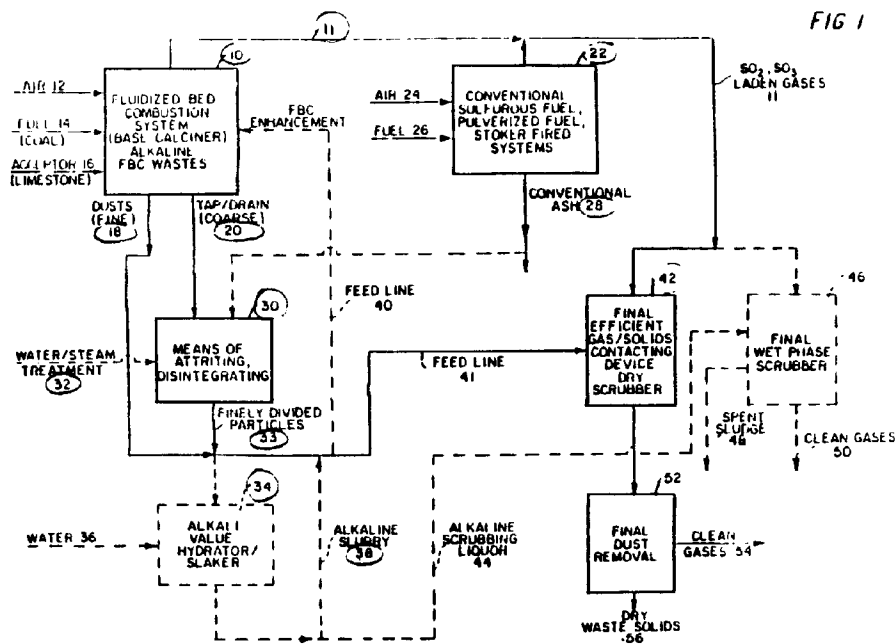


COMMISSIONER'S DECISION

Obviousness. claim 1 was considered obvious in view of the cited art, the others acceptable in view of that art. Rejection modified.

This decision deals with Applicant's request for review by the Commissioner of Patents of the Final Action of application 410,060 (Class 23-348) filed August 25, 1982. Assigned to Foster Wheeler Energy Corporation, it is entitled USE OF WASTE SOLIDS FROM FLUIDIZED BED COMBUSTION PROCESSES FOR ADDITIONAL FLUE GAS DESULFURIZATION. The inventors are Robert D. Stewart and Robert L. Gamble. The Examiner in charge issued a Final Action on August 1, 1985, refusing to allow the application. By letter dated October 27, 1988, the Applicant withdrew the request for a Hearing.

The invention relates to a flue gas desulfurization process using the fine and coarse wastes from a fluidized bed combustion system, as shown in figure 1 reproduced below:



In the Applicant's system sulfurous coal burns in air in the presence of limestone particles in a fluidized bed 10 and wastes emerge as exhaust gas 11, fine dusts 18, and coarse particles 20. To reduce the SO₂ and SO₃ content in the exhaust gas, the coarse waste is ground at 30 to fine particles 33 to expose additional active surface area and so obtain an increased alkaline value, and the fine particles are fed into the fluidized bed to act on the exhaust gas. The fine particles may be mixed with the fine dusts and either fed to the fluidized bed or, to slaker/hydrator 34 to produce a calcium hydroxide slurry 38 to be injected into dry scrubber 43, or, slurry 38 may be thinned with water and fed to wet scrubber 46. The scrubbers clean the exhaust gas 11. Additionally, ash particles 28 from an adjacent combustion system 22 may undergo a water/steam treatment 32 before entering grinding means 30 to mix with particles 20 to produce the fine particles 33. The exhaust gas from system 22 may also be treated by the scrubbers.

The examiner refused all the claims in view of the following patents:

British Patent

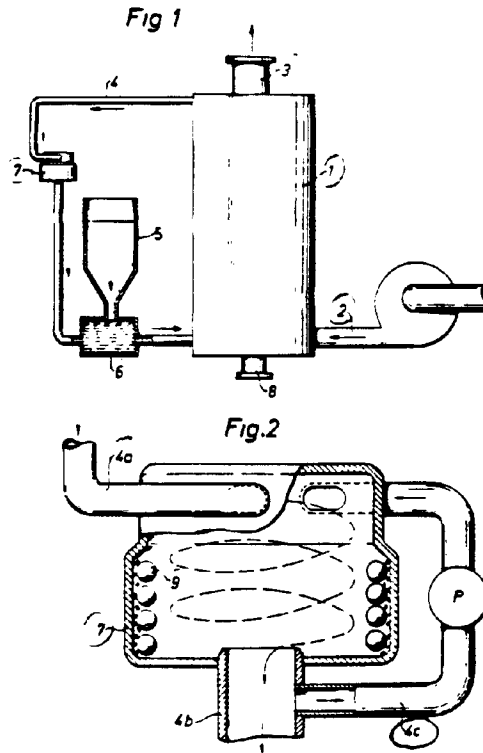
824,883 Dec. 9, 1959

United States Patents

3,708,266	Jan. 2, 1973	Gustavsson
3,751,227	Aug. 7, 1973	Robinson
4,081,513	Mar. 28, 1978	Moss

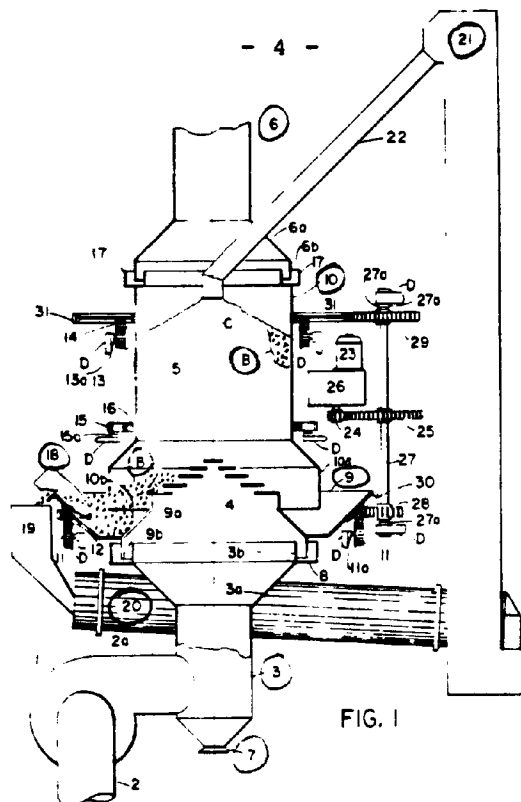
The British Patent to Atomenergi describes a method of burning the combustible constituents of a sulfur-containing shale or fuel in a fluidized bed with limestone to bind a great part of the emitted sulfur in the solid combustion residue. In the Atomenergie process, the grains of solid fuel are said to be below 6 mm., and the combustion temperature below the temperature of rapid dissociation of the carbonate.

The Gustavsson Patent sets forth apparatus to wash sulfur dioxide from flue gases originating from coal fired systems, as shown in figures 1 and 2 reproduced below:



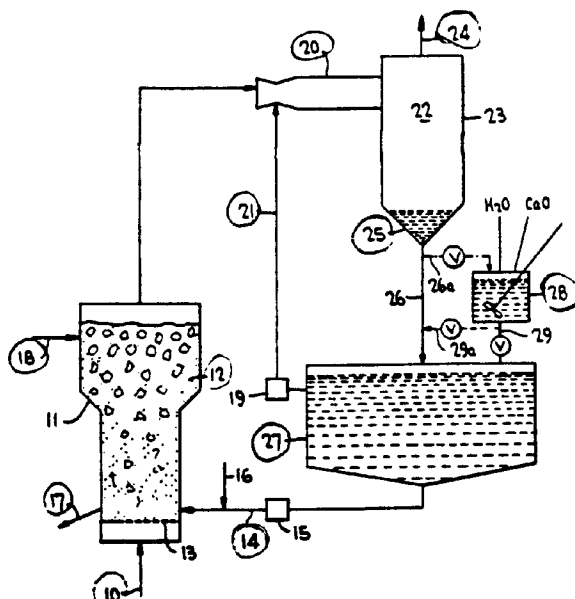
The SO_2 gas enters absorption column 1 at 2, entrains calcium carbonate particles from a slurry 6 fed to the bottom of the column, and reacts with them in rising to form an inactivated sulphite/sulphate coating thereon. The cleaned gas emerges at 3 and the coated particles are led from the top 4 to a mill 7. Entering tangentially at 4a, the coated particles are crushed by grinding bodies 9 to expose active areas in being reduced in size. Part of the flow leaving mill 7 is passed through 4c by a pump P to enter tangentially in the mill, level with 4a to assist in grinding. Consumed absorbent is discharged at 8.

The Robinson patent pertains to apparatus to pass a waste gas through a moving mass of limestone particles, as shown in figure 1 reproduced below:



The SO_2 containing gas enters from the bottom 3 to column 10 and reacts with limestone particles B to form a coating on their exterior. The treated air exits at 6. Column 10 and tray 9 rotate at different speeds and subject the coated particles to abrasive action which exposes fresh active surfaces as they move from the column to the tray and are forced by plow 18 to drop into the downwardly inclined rotary conveyor 20 to elevator 21. The elevator feeds the recycled particles back to the column. Spent substance is removed at 7.

In the Moss system, shown by figure 1 below,



gas 10 bearing SO_2 is introduced at the bottom of a bed of particles 12 containing calcium oxide. The heat from the gas fluidizes the lower part of the bed which acts with the slurry from line 14 so that the water evaporates and the sulphites are converted to agglomerates of sulphate solids/solutes. The agglomerates are removed at 17 and are ground to a smaller size, and returned via line 18 to the top particles 12 to act on the upwardly flowing vapors to fix SO_2 . Additional particles may be added via line 18. The resulting vapor/fines mixture is scrubbed 20 by a lime slurry 21 to remove SO_2 and the fines, which are then separated in vessel 23. The resulting gas leaves at 24 and the water/solids mix passes from the bottom 25 to settling tank 27 for mixing with a lime/water slurry from tank 28. Pump 15 moves the coarse particles from the base of tank 27 to the base of particle bed 12 for the fluidizing action.

In rejecting all the claims in view of the cited patents, the Examiner said in part, as follows:

...

It is common general knowledge that if the surface of a sorbent becomes fouled its ability to function as a sorbent is impaired; see Robinson and Gustavsson, for example. It is also well known to grind a spent sulfur oxide sorbent such as limestone to remove surface fouling and to reduce the particle size of the initially supplied coarse limestone (see Gustavsson). Given the foregoing it is expected skill to modify the fluidized bed combustion process of British patent 824,883 in the manner proposed by the applicant. Accordingly claims 1-7 are rejected.

Claims 8-18 are rejected in view of the above discussed patents in combination with Moss which teaches the injection of aqueous alkaline material into a fluidized bed process for the purpose of controlling sulfur emissions.

Applicant is respectfully requested to note that the claims are being rejected because they are considered to be obvious in view of the references, not because the references may be mosaiced to establish anticipation. The latter practice is an American one that does not prevail in Canada.

Robinson was cited for the purpose of establishing that it is known that if the surface of a sorbent becomes fouled, its ability to function as a sorbent is impaired. Thus it is immaterial that Robinson does not

comminute, remove or circulate. What is germane is the fact that fresh surfaces are provided, thereby renewing the sorbent.

Similarly, Gustavsson was cited to show that a spent sulfur oxide sorbent such as limestone can be ground to remove surface fouling (and to reduce the particle size of the initially supplied coarse limestone) and then returned to the gas purification process from which it originated. Therefore, it is immaterial that Gustavsson does not relate to a fluidized bed process.

Given the foregoing it is expected skill to modify the fluidized combustion process of British patent 824,883 in the manner proposed by the applicant. Claims 1-7 are obvious in view of British patent 824,883 when considered in conjunction with the common general knowledge that is exemplified by Robinson and Gustavsson. These claims are rejected for this reason.

Moss was cited for the purpose of establishing that injection of aqueous alkaline material into a fluidized bed process, for the purpose of controlling sulfur emissions (a feature in instant claims 8-18), is known. It is not material that Moss does not grind or comminute. All that Moss must teach in order to sustain the examiner's position is the injection (in the locale and for the purpose noted above) of aqueous alkaline material, and this it does. Moss thus augments the teachings of British patent 824,883, with which it is obvious to combine as both relate to the combustion of fuel in a fluidized bed.

Claims 8-18 are, given the common general knowledge that is exemplified by Robinson and Gustavsson, obvious in view of the combination consisting of British patent 824,883 and United States patent 4,081,513. Claims 8-18 are rejected for this reason.

...

The Applicant argues that the claims are acceptable in the following terms, in part:

(The Examiner) postulates that a sorbent's ability to function as a sorbent is impaired when its surface becomes fouled and that the prior art references of Robinson and Gustavsson set out methods and apparatus for presenting fresh surfaces of limestone to further act as a sorbent of sulfur oxide. Having said that, Examiner Kirk then jumps to the British patent of fifteen years earlier wherein carbon-containing shale is "burned" with limestone -- and also with some chlorides to reduce the sulfur oxide content of the gas emitted from the burning.

... To project the attrition of the limestone particles of Gustavsson into the desulfurization of the shales of the British patent is not an obvious step even in the eyes of the knowledgeable and fully informed skilled artisan. The Applicant has taken the subject matter of Robinson and Gustavsson -- and particularly of Gustavsson -- and has by experiment and trial and testing managed to recycle and recrusher the coarse limestone sorbent particles and reinjected them into

the fluid bed of sulfurous fuel particles for further desulfurizing effect. The lack of obviousness in applying the attrition of limestone particles in a fluidized bed of fuel particles is enhanced by the fact that since Gustavsson and Robinson (and Moss), there have been no other prior art disclosures available to show the application of the 1973 subject matters to fluidized beds of solid particles in the past twelve years. In order to reject claims on the basis of obviousness the subject matters of one published reference must be directly applicable to the subject matter of the earlier publication and there is nothing to show that the coated limestone sorbent particles of Gustavsson could be mixed with the carbon shales of Atomenergi's method and then withdrawn for attrition and recycling. Such attrition would have to take place with the slag shale particles as well as the sorbent particles and such recycling and crushing is obviously not feasible.

Five years after Robinson and Gustavsson, Moss shows that sulfur from the coal is fixed in the limestone as sulphides and transferred downstream to a regenerator with oxygen to convert the sulphides to the oxides, after which the oxide containing regenerated limestone particles are returned to the bed of fluidized coal particles. Even with the knowledge of Robinson and Gustavsson, Moss twenty years after the Atomenergi patent for removing sulfur from shale did not show any knowledge or suggestion or possibility of creating fresh surfaces in the regenerated limestone particles by crushing or attriting. It is the Applicant's position that to now academically hold that it is now obvious to so attrite the limestone sorbent particles in the desulfurization of a fluid bed of pulverized sulfurous fuels is stretching the concept of accumulation of previous publications to establish such obviousness.

In contrast to such holdings of obviousness it is the Applicant's restated position that Examiner Kirk is assembling the subject matters of the published references in a mosaic to anticipate the definition of this invention in the claims. Examiner Kirk has rejected the Applicant's position on mosaicing on the basis that the practice is an American one and does not prevail in Canada. The Applicant draws the Board's attention to Mico Products Ltd. v. Acetol Products Inc., (1930) Ex. C.R. 64 at 72. The accepted and acknowledged author on Canadian Patent law, Dr. Fox, in his Fourth Edition of his textbook on Canadian Law and Practice Relating to Letters Patent for Inventions recites at Page 138 with approval James L.J. in Von Heyden v. Neustadt:

"What we have got in this case is not one clear statement by one writer, but a mass of paragraphs exhumed by the industry of the defendant's advisers from a number of publications...We are of opinion that if it requires this mosaic of extracts from annals and treatises spread over a series of years, to prove the defendant's contention, that contention stands thereby self-condemned. ...And even if it could be shown that a patentee had made his discovery of a consecutive process by studying, collating and applying a number of facts discriminated

in the pages of such works, his diligent study of such works would as much entitle him to the character of an inventor as the diligent study of the works of nature would do."

At Page 139 Dr. Fox states

"The rule against making a mosaic of documents does not apply when the documents are connected together and form a consistent wholewhere anybody reading one is referred by cross-reference to the others."

Examiner Kirk has applied the Moss patent specifically to establish the prior occurrence of an injection of alkaline material into the fluid bed process and the Applicant does not deny or contradict that prior subject matter. Nevertheless, the alkaline slurry is only an additional step in Claims 8 et seq and it does not form any part of broad Claim 1. In this manner, the Applicant believes that it is clear that Moss has been mosaiced with Gustavsson and/or Robinson to reject Claim 8 and then only with the combination of all two (or three) prior publications can be taken back fifteen years in time to employ them with the Atomenergi method for extracting burnable gases from oil shales with reduced sulfur content.

In summary, the Applicant's position is that the desulfurizing treatment of gases with comminution of the sorbent particles can not be combined with the oil shale treatment of the Atomenergi patent because the comminution of Gustavsson could not be applied to the Atomenergi shale particles.

The Issue before the Board is whether the subject matter of claims 1 to 18 is obvious in view of the cited patents. Claim 1 reads:

A process for obtaining additional flue gas desulfurization using waste solids from a fluidized bed combustion system in which sulfurous fuels are burned in a bed of acceptor particles, comprising the steps of:

- (1) withdrawing coarse waste particles from said fluidized bed combustion system;
- (2) subjecting said coarse waste particles to means for attriting and disintegrating whereby said coarse waste particles are reduced to finely divided particles having increased available alkaline chemical value; and,
- (3) injecting said finely divided waste particles into said fluidized bed combustion system whereby additional flue gas desulfurization is achieved.

We observe the Atomenergie patent discloses a one stage removal of sulfur from waste gas by using a certain size of particles and a combustion temperature below the dissociation temperature of carbonates in a fluidized bed to bind sulfur that would otherwise

exit in the waste gas. We learn that the Moss patent provides a two stage removal of sulfur from a waste gas. The first stage, similar to Atomenergie, reacts on sulfur in the waste gas as it passes through fluidized reactive particles in a de-sulfurization column. The second stage receives the exiting gas from stage one and submits it to a scrubber/separator operation, the resulting gas exiting to atmosphere and the sulfur containing solids settling out. Moss recycles the solids separated from the gas as part of a slurry fed to the fluidized reactive particles.

The applicant provides a two stage treatment to remove sulfur from waste gas. The first stage, like that in Atomenergie and in Moss, reacts on waste gas in a fluidized bed to bind sulfur. The second stage, like that in Moss, provides a scrubber/separator operation from which the resulting gas passes to atmosphere and the sulfur containing solids settle out.

We think the Applicant employs part of the Moss system that achieves additional flue gas desulfurization, in that the Applicant provides a fluidized bed of particles to act on sulfur that is part of a flue gas, as does Moss. Both the Applicant and Moss remove from the fluidized bed, particles that have been coated due to reaction with the sulfur, and pass them through a grinder to produce smaller particles having fresh active surfaces. These smaller particles are then introduced into the upper part of the fluidized bed where they contact the flue gas.

We note the Applicant has referred to Mico Products Ltd. v Acetol Products Inc. (1930) Ex.C.R. in his response, and we find direction from the following passages:

It may, however be said that there is even no invention in a mere adaptation of an idea in a well known manner for a well known purpose, without

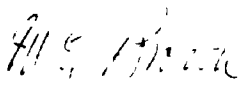
ingenuity, though the adaptation effects an improvement which may supplant an article already on the market.

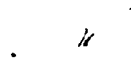
A patent for the mere new use of a known contrivance, without any additional ingenuity in overcoming fresh difficulties, is bad, and cannot be supported. If the new use involves no ingenuity, but is in manner and purposes analogous to the old use, although not quite the same, there is no invention.
as said by Lord Lindley, in the case of *Gadd and Mason v. The Mayor, etc. of Manchester* (1).

In our opinion, therefore, the Applicant's claim 1 sets forth no more than the steps disclosed by the Moss patent for obtaining flue gas desulfurization, namely, withdrawing coarse waste particles from a fluidized bed, causing them to become finely divided particles having increased active surfaces, and injecting the finely divided particles into the fluidized bed so that they react with the gas. We are persuaded that the Applicant's choice of a particular fluidized bed does not add any patentable feature to claim 1. We find claim 1, therefore, not to be patentable in view of the Moss patent.

We observe that none of the cited patents disclose any means to collect fine dusts from a desulfurization column and mix them with the crushed finely divided particles and then introduce the mix into a fluidized bed, nor to submit the mix of the fine dusts and the divided particles to a gas/solid contacting device before injection into a fluidized bed, nor to treat the coarse particles to steam/water injection. We find the subject matter set forth in claims 2 to 18 is acceptable in view of the cited patents.

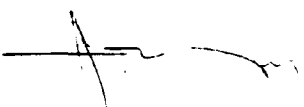
We recommend therefore the rejection of claim 1 be maintained for being obvious in view of the cited patents, and we recommend that the rejection of claims 2 to 18 be withdrawn.


M.G. Brown
Acting Chairman
Patent Appeal Board


S.D. Kot
Member

I have reviewed the prosecution of this application, and I concur

with the findings and the recommendations of the Patent Appeal Board. Accordingly, I refuse to grant a patent containing claim 1, and I withdraw the rejection of claims 2 to 18. The Applicant has six months within which to appeal my decision under Section 42 of the Patent Act.



J.H.A. Gariépy
Commissioner of Patents

Dated at Hull, Quebec
this 10 day of January 1989